

Assessment of Nearshore Fish around Akutan Harbor  
Using Beach Seines During March and June 2000.

by

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## **Abstract**

We sampled nearshore fishes from Akutan Harbor at Akutan Island (eastern Aleutian chain, Alaska) during March and June 2000 using a beach seine. A total of 6,445 fish were caught, comprising at least 14 fish species (one helmet crab was the only invertebrate species caught) from a total of 27 sets. Only 6 of 15 sets made in March caught fish (5 sets containing 2 fish, and 1 set containing 1 fish), whereas all 12 sets made in June caught fish. Over 99% of these fish were pink salmon that were collected in only two sets. Adult rock sole and Dolly Varden were the next most abundant species. The pattern of low numbers of nearshore fish in winter and large numbers of juvenile salmon in June is common in Alaskan nearshore waters. Results also indicate the presence of several key forage fish species (sand lance, capelin, and Pacific cod).

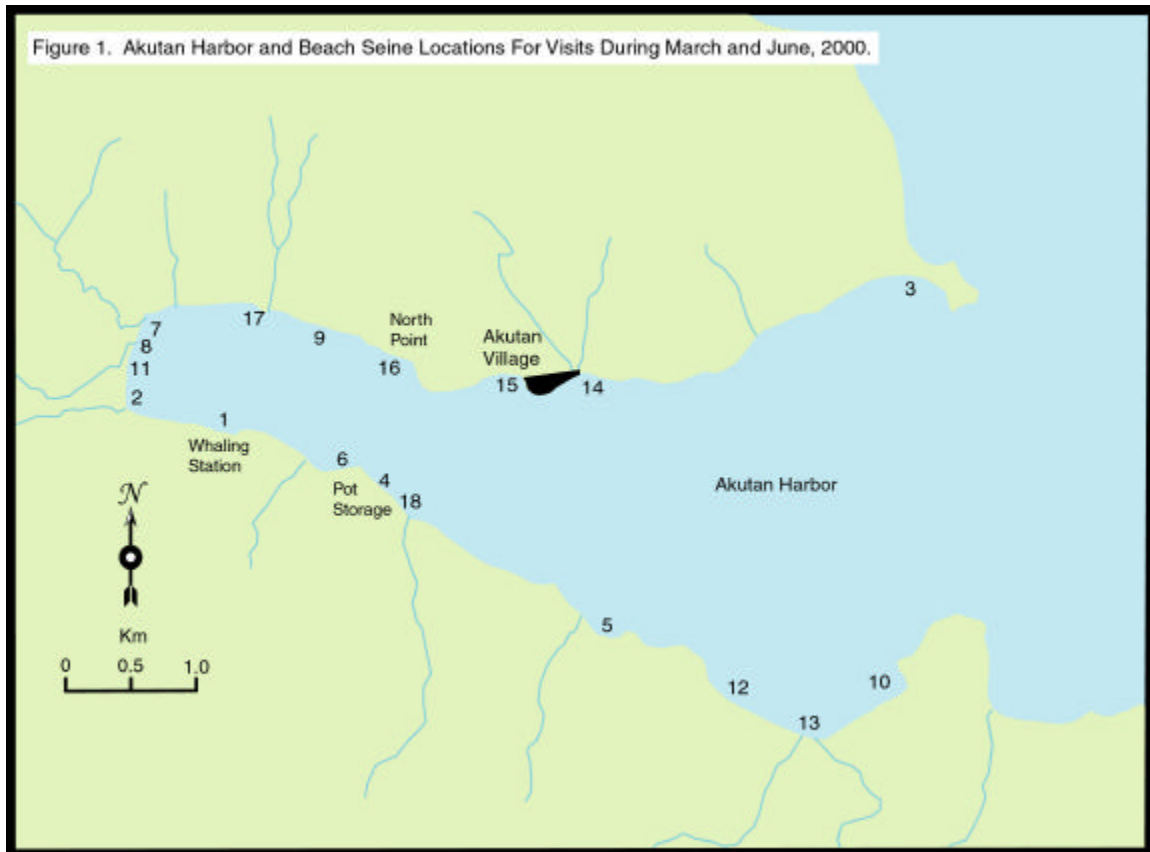
## **Introduction**

Inshore habitats are routinely used by a variety of small schooling (forage) fish (e.g., capelin *Mallotus villosus* and sand lance *Ammodytes hexapterus*). Furthermore, they act as nursery areas for many other marine fish species (Poxton *et al.*, 1983; Orsi and Landingham, 1985; Bennett, 1989; Blaber *et al.*, 1995; Dalley and Anderson, 1997) including several of commercial importance (e.g., Pacific salmon [*Oncorhynchus spp.*], walleye pollock, and herring [*Clupea pallasii*]). The distribution and health of marine predator populations also depends on the abundance and distribution of their prey species. Declines in a variety of predator populations in the Gulf of Alaska have been linked to shifts in abundance and composition of small schooling (forage) fish stocks over the past 45 years (Anderson and Piatt, 1999). The waters of Akutan Harbor host a variety of marine predators including mammals and commercial fish. The distribution and abundance of forage species around Unalaska may well affect the status of these predators, but little is known about spatial patterns of forage species in this area. This study was established to provide some baseline data on the nearshore distribution of different fish species around Akutan Harbor. This area has also been proposed for a new harbor.

## **Methods**

### *Study Area*

Akutan (population <100) is located on Akutan Island in the eastern Aleutians, one of the Krenitzin Islands of the Fox Island group. It is 35 miles east of Unalaska, and 766 air miles southwest of Anchorage. Many of the residents of Akutan are Aleut. A new harbor has been proposed for this area to provide infrastructure support for the commercial fishing industry.



### *Fishing Protocol*

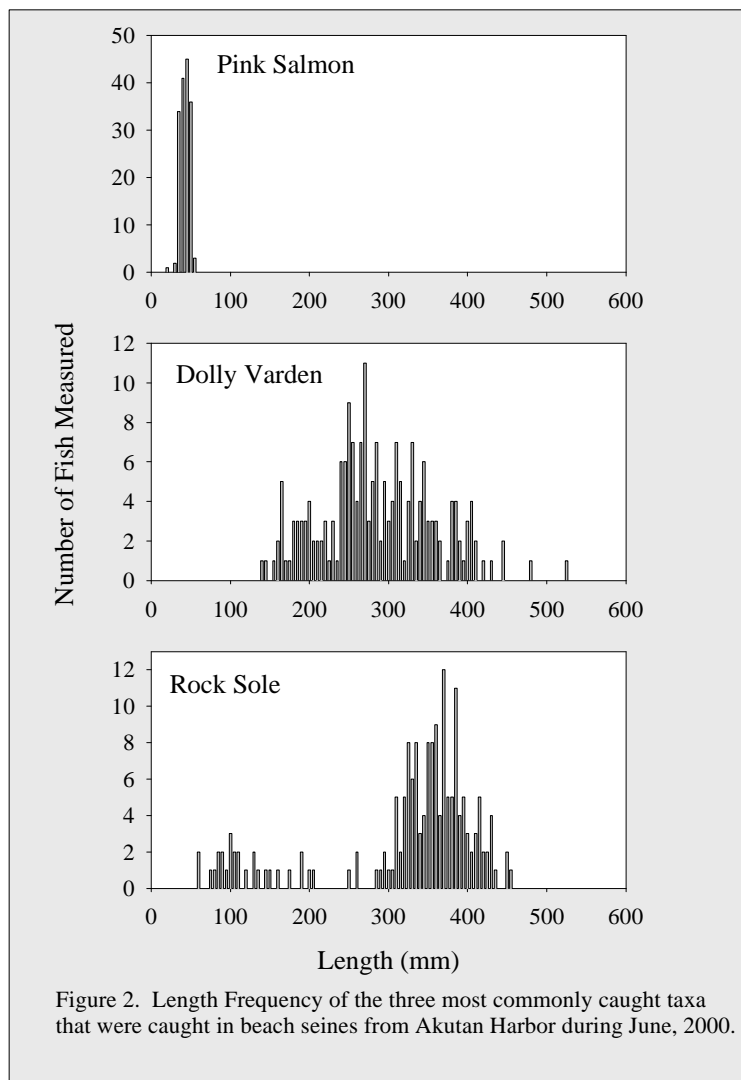
We used beach seines to sample nearshore fish communities from 14 March to 16 March 2000, and from 8 June to 9 June 2000. This fishing method effectively and non-selectively samples shallow, inshore waters with sandy or smooth bottoms (Cailliet *et al.*, 1986). Our variable-mesh net was 37 m long. The wings were tapered from 2.4 m in the middle to 0.5 m at the wing using 28 mm knotless nylon stretch mesh. The seine was equipped with a 6 mm stretch mesh bag located in the middle of the seine. Thirty meters of rope were attached to the ends for deployment. The net was set parallel to shore about 15 m from the beach as described by Cailliet *et al.* (1986).

We sampled 18 sites around Akutan Harbor (Fig. 1). As the tidal range is very small in this area we sampled indiscriminate to tide. A single set was made as this usually provides good representation of species richness and dominant species rank (Allen *et al.*, 1992; Robards *et al.*, 1999a). Fish were sorted by species, counted, and subsampled individuals were measured to total length.

### **Results and Discussion**

Beach seines were effective at catching fish during June but indicated few fish in nearshore areas during March (Table 1). From the 27 sets made in Akutan Harbor during our investigation, a total of 6,445 fish and 1 invertebrate comprising at least 15 species

(including the one invertebrate species) were caught (Table 1). The resultant catch-per-unit-efforts (CPUE) for March and June were 0.7 and 536, respectively. Only sporadic fish in catches during March was expected; winter catches of nearshore Alaskan fish are generally very low (Robards *et al.*, 1999). However, 536 fish per catch in June was similar to summer 1999 catches in Dutch Harbor (653) and somewhat higher than beach seines made in other areas of Alaska. For example, CPUEs of 305-511 were recorded in Kachemak Bay (Robards *et al.*, 1999a), 57 in Glacier Bay (Robards *et al.*, 1999b), and 28 in Clam Lagoon (Adak; Hancock, 1975). Of the three commonly caught species, juvenile pink salmon dominated as they utilized nearshore areas for feeding and growth prior to migrating into oceanic waters. Catches of adult Dolly Varden and Rock Sole were lower as expected due to their more advanced life-stage. Both of these species were presumably utilizing the large numbers of juvenile pink salmon as prey. Size distribution of these species is depicted in Figure 2 (see also Table 2).



Mean size for pink salmon in early June was 41 mm indicating they probably reached salt water sometime in mid-May (Heard, 1991). Results from LGL, Alaska Research Associate's early May (2000) sampling would concur with this.

Pacific cod, capelin, and sand lance are all schooling fish that although present in this study, were not caught in significant numbers. However, their presence does suggest that larger numbers of these trophically important species are in the area; either eluding our sampling, in deeper waters, or outside the range of our study area. The juvenile cod that were caught were close to kelp beds that were not sampled. Use of this type of refuge by cod would leave them under-represented in our samples. Juvenile sand lance, capelin, and cod are all generally more common in the latter part of the summer and may not have been present in large numbers at the time of sampling. Furthermore, during June these species (and life stages) are still very small. Small sand lance were seen escaping from the net (by passing through the mesh) on those sets where a few were caught.

The overall diversity of species in Akutan waters (13 species) appeared somewhat depauperate compared to other subarctic areas of Alaska. Isakson *et al.* (1971) caught 40 species in the nearshore waters of Amchitka Island, Robards *et al.*, (1999a) found 50 species in Lower Cook Inlet, and Orsi and Landingham (1985) found 42 species at a southeast Alaskan site (Auke Bay). However, our short sampling period and limited numbers of seines probably missed species that are only seasonally present at other times. The number of species was similar to that found in Dutch Harbor (16) during limited beach seining conducted in summer 1999.

### **Recommendations**

High-latitude fish assemblages, particularly those found in shallow water habitats, are subjected to large seasonal variations in temperature and day length. These physical factors impart a strong natural seasonality to community structure (Nash, 1988). Some fish species move from shallow water habitats to deeper waters in winter when thermal tolerances are exceeded (Allen and Horn, 1975; Allen, 1982; Bennett, 1989). Decreases in catch size between spring and fall peaks are frequently reported (e.g., Livingston, 1976; Horn, 1980; Allen, 1982; Thorman, 1986; Methven and Bajdik, 1994; Robards *et al.*, 1999a). These other studies highlight the need for seasonal sampling to establish a full picture of both the species assemblage within an area as well as how abundance changes through a season.

As mentioned earlier, our sampling of the nearshore is restricted to suitable substrates for beach seining. Areas of rocky terrain (which existed within all study areas) or kelp may support other fish species.

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Appendix 1: Common and scientific names for the species caught.

Common Name	Scientific Name
Pink Salmon	<i>Oncorhynchus gorbuscha</i>
Dolly Varden	<i>Salvelinus malma</i>
Walleye Pollock	<i>Theragra chalcogramma</i>
Pacific Cod	<i>Gadus macrocephalus</i>
Capelin	<i>Mallotus villosus</i>
Kelp Greenling	<i>Hexagrammos decagrammus</i>
Rock Greenling	<i>Hexagrammos lagocephalus</i>
Crescent Gunnel	<i>Pholis laeta</i>
Sand Lance	<i>Ammodytes hexapterus</i>
Silverspotted Sculpin	<i>Blepsias cirrhosus</i>
Great Sculpin	<i>Myoxocephalus polyacanthocephalus</i>
Red Irish Lord	<i>Hemilepidotus hemilepidotus</i>
Northern Sculpin	<i>Icelinus borealis</i>
Rock Sole	<i>Lepidopsetta bilineata</i>
Starry Flounder	<i>Platichthys stellatus</i>
Helmet Crab	<i>Telmessus cheiragonus</i>